

Variation of Fertility-Related Traits in Italian Tomato Landraces under Mild Heat Stress

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Abstract : Studies on reproductive dynamics in crops subjected to heat stress are crucial to breed more tolerant cultivars. In tomato, cultivars, breeding lines, and wild species have been thoroughly evaluated for the response to heat stress in several studies. Here, we address the reaction to temperature stress in a panel of selected landraces representing genotypes cultivated before the advent of professional varieties that usually show high adaptation to local environments. We adopted an experimental design with two open field trials, where transplanting was spaced by one month. In the second field, plants were thus subjected to mild stress with natural temperature fluctuations. The genotypes showed wide variation for both vegetative (plant height) and reproductive (stigma exertion, pollen viability, number of flowers per inflorescence, and fruit set) traits. On average, all traits were affected by heat conditions; except for the number of flowers per inflorescence, the “G*E” interaction was always significant. In agreement with studies based on different materials, estimated broad sense heritability was high for plant height, stigma exertion, and pollen viability and low for the number of flowers per inflorescence and fruit set. Despite the interaction, traits recorded in control and in heat conditions were positively correlated. The first two principal components estimated by multivariate analysis explained more than 50% of the total variability. The study indicated that landraces present a wide variability for the response of reproductive traits to temperature stress and that such variability could be very informative to dissect the traits with higher heritability and identify new QTL useful for breeding more resilient varieties.

Keywords : fruit set, heat stress, *solanum lycopersicum* L., style exertion, tomato

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